

*Abstract of Prof. Christian Mayer's (of Heidelberg) Vertheidigung neuer Beobacht. Gruendliche von Fünf Stern Trabanten entdeckt in der Mannheim. Sternwarte. Mannh. 1778, 8vo., pp. 308, 2 plates. By S. M. Drach, Esq.*

This almost forgotten little work contains a reference to the author's first proposal at the Mannheim Academy (on 17th Oct., 1777) of observations of Binary Star Systems, before Sir W. Herschel's discovery of *Uranus*. I first heard of it in Mädler's *Populär Astron. (Doppelst., Art. 205, ed. 1841)*. The Royal Society, and British Museum (1395 e), each possess a copy. Berlin has not yielded me a copy for presentation to the Royal Astronomical Society, and my two MS. versions, given to Mr. Williams for our Society, seem to have been lost in the confusion of moving—a fate that also overtook Reich's first Cavendish Experiments in 1828-9, and possibly other fugitive tracts.

The author was furnished with London-made instruments, was supported in his views by Maskelyne and La Caille, versus the vituperative opposition of Father Hell of Vienna. The first portion is a reprint of newspaper articles—Mayer, in *Mannheim Zeitung* (No. 84, Oct. 20, 1777; Nos. 93-4, Nov. 20-24, 1777; No. 102, Dec. 22, 1777): and Hell, in *Wiener Diarium* (No. 90, Nov. 8, 1777; No. 99, Dec. 10, 1777; No. 102, Dec. 20, 1777).

The first is an account of 100 new fixed star satellites (f. ss.) observed January 30, 1776, to September 14, 1777, by Mayer and his assistant John Mezger, beginning with *Arcturus and its 15 Satellites (comes)*.

Hell wrote in 1759 to Paris that said satellites are only small fixed stars; and that Mayer and Mezger's small variations had been noticed by Tycho Brahé.

Mayer keeps to the word *comes*; refers to Riccioli's *Almagest*, t. 1, bk. 7, ch. 3; to Flamsteed and Maskelyne, and says these diff. prop. mot. would make Sidereal Astronomy wonderfully progressive.

M. Hell sent in 1759 (1758?) to Paris a catalogue of 13 mobile fixed stars.—Tycho Brahé. See La Lande, *Astronom.*, t. 3, p. 154, No. 2573 (*Astron. instaurat. Progymnast. An. 1610*, p. 233). M. Hell's letter to La Caille, August 20, 1758, on variable latitude of 17 stars: received Mayer's writings through Mr. Brawdler, a learned Englishman. (? Bowdler, S.M.D.)

P. 42, Mayer's original Memoir, *De centum stellarum fixarum comitibus eorumque insigni usu ad determinandum motum proprium fixarum.*

At p. 49 begins the author's dissertation: that the instrument was a Bird's mural quadrant of 8 feet, fixed up in 1775, and so accurate that Bird obtained a reward of 500l., enabling 3rd magnitude stars to be seen at 10 A.M.; he argues, from Saturnian satellites, on the possibility of fixed-star ones.

Thus, *Comes Arcturus* followed in 1758 in  $3\frac{2}{3}$ <sup>s</sup> time; in 1777, in  $6\frac{1}{2}$ <sup>s</sup> time: whereby (p. 65) all the comparisons of 500 or 1,000 years between instruments of extreme degrees of perfection are avoided.

Thus, Feb. 14, 1690, Flamsteed saw *Arcturus* 3<sup>s</sup> after its *Comes* (7-mag.): and 26' 30" N. of *Comes*, in April 1736, at Greenwich, *Arcturus* preceded by  $1\frac{1}{2}$  to  $1\frac{3}{4}$ <sup>s</sup>, and north by 24' 55".

In May 1765, Maskelyne made difference 4<sup>s</sup> time.

Mayer himself, in May 1777, found it 6 to  $6\frac{1}{2}$ <sup>s</sup>.

P. 71 refers to Halley's announcement of proper motions, *Phil. Trans.*, No. 355, p. 736, for 1719; but La Lande, Tob. Mayer, &c., all trod in Halley's footsteps.

P. 78. Maskelyne in 1765-77 observed *Comes to Arcturus*,  $\alpha$  *Scorpii*,  $\alpha$  *Aquilæ*,  $\alpha$  *Lyræ*,  $\alpha$  *Cygni*,  $\eta$  *Gemini*,  $\epsilon$  *Lyræ*, and twelve others, which Maskelyne calls *comes fixarum*.

P. 81. Kästner, at Göttingen, has a 6-foot Bird's mural quadrant. Maskelyne's Letter, December 1, 1777, to Meyer concurs in his views; having on August 7, 1777, seen a 6-mag. star  $\alpha$  *Hercul.* (Extract, Latin Letter.)

P. 90. Author adds  $\alpha$  *Centauri*,  $\alpha$  *Hydræ*, *Castor*,  $\gamma$  *Virginis*,  $\delta$  *Serpens*. A *Ophiuchi*,  $\beta$  *Sagittar.*  $\circ$  *Capric.*  $\zeta$  *Cancri* are all double stars (*Doppelsterne*); and  $\alpha$  *Aries* (on December 23, 1876). *Cor Caroli* (2<sup>s</sup>, 17") ; *Regulus's* (10<sup>s</sup>, 57"5);  $\xi$  *Bootis* has (8<sup>s</sup>, 18"). The double star *Castor* has one (3 $\frac{1}{2}$ <sup>s</sup>, 4");  $\nu$  *Scorp.* (2<sup>s</sup>, 33");  $\beta$  *Scorp.* (1<sup>s</sup>, 17 $\frac{1}{2}$ "); near  $\epsilon$  *Delphin.* (2<sup>m</sup>, 1') is a double star (apart 1<sup>s</sup>8, 3 to 5"); also  $\gamma$  *Delph.* (1<sup>s</sup>, 11").  $\gamma$  *Androm.* (2<sup>s</sup>, 4"5);  $\delta$  *Orion.* (0<sup>s</sup>, 50"):  $\beta$  *Lyræ* (2<sup>s</sup>, 40");  $\alpha$  *Cygni* (1<sup>s</sup>, 2"5); a double star, with a comes (15<sup>s</sup>, 93"); a double star near  $\gamma$  *Pers.* one near  $\alpha$  *Androm.*; a tri-star near  $\alpha$  *Pisc.*;  $\iota$  *Cancri* is a double star,  $\epsilon$  *Cancri*,  $\gamma$  *Cygni*,  $\beta$  *Lyræ*,  $\zeta$  *Aquarii*,  $\pi$  *Pisc.*

P. 107. Finds in two years a change in light, apparent magnitude, and distance from greater member, to be thought of (bedenklich).

P. 108. Author asks if these starlets will fade away; and if this proper motion falls on small stars; if they move rectilinearly, or circularly round the greater star as their centre of gravity, whilst the greater and higher one courses round another sun or planet? or if, *vice versâ*, these starlets as a whole force the greater one to move round them? Quotes Le Seur and Jacquier on Newton. (*Princip.* tom. iii. *Gener.* fol. 670.)

P. 112. These double stars are either, 1) the smaller are opaque ones revolving round the larger; 2) dark spheres, round which mobile suns move; 3) or both luminous, revolving round a common point of rest: exemplified in solar system.

P. 116. Recounts new stars seen—his observations of Comet of 1769, August–September, at St. Petersburg (Euler's period of 340 years). P. 123, quotes Lambert and Maupertuis (*Lettres Progr. Science*, sect. 9, fol. 400. Central Sun).

P. 133. Proves Fixstar-satellites from changeable position of *Comes* to principal star; from observations upon Flamsteed's

time, especially (p. 179) *Arcturus*: Anno 1690 —  $3^{\circ} 26' 30''$  to 1778, +  $5^{\circ} 67$ , and  $23' 33''$ . P. 176–9, details Plate 1.

Then follows another refutation of Father Hell, with a detailed description of the Mannheim Bird's mural quadrant, and observations therewith.

He then (p. 206) explains the other diagrams of Plate 2; and this is followed by further anti-Hellite arguments, with extracts from La Lande,\* Tycho Brahe, Halley, ending with Mayer's insisting on his method being new, *truly useful and excellent*; so that by the *differences* of motions of stars to each other, we will sooner acquire a notion of their movements, than by the old method of contemplating the absolute displacements from a common fixed point.

14 Feb. 1876.

### *Preliminary Note on Photographing the Least Refracted Portion of the Solar Spectrum.*

By Capt. W. de W. Abney, R.E.

Within the last two years there have been many attempts made to photograph the least refrangible rays of the spectrum; and though stated to have been accomplished by the elder Draper on a daguerreotype plate in the early days of photography, yet there is reason to believe that this was effected by the reversing action of these rays on slightly exposed sensitive iodide of silver, and that really no direct photographic impression had been obtained till Dr. Vogel published an account of a method for effecting this object in 1874. More recently, Capt. Waterhouse, of the Bengal Staff Corps, has followed up Dr. Vogel's researches, and with a larger share of success than the originator. Both these gentlemen have had resort to aniline dyes of varying colour, using it with the preservative to the plate; and they state that the red end of the spectrum is most sensitive when a red dye (naphthaline) or rosine is employed, and propound generally that the rays that can be photographed are dependent on the colour of the dyes employed: that colour, and not the ingredient added to the sensitive silver salt, is the essential.

Lately I have had occasion to investigate the subject, and have met with such good results that I desire to communicate a preliminary Note to the Society. I have carefully repeated the previous experiments of Vogel and Waterhouse, and only attained partial success with them, though there was sufficient evidence to show that with the dyes the desired end would be attained. Looking more carefully into the chemistry of the

\* *Vide* La Lande's *Bibliographia Astronomica*, p. 565. Refers to *Journal des Savans*, Feb. 1779.